SEU Theme Update

Including Beyond Einstein

Structure and Evolution of the Universe Subcommittee

Paul Hertz

SEU Theme Scientist & Beyond Einstein Program Scientist

23 October 2003

Structure and Evolution of the Universe Developmental Missions Status

	Launch	Aug	Sep	Oct	STATUS
GP-B	Dec '03	YEL	YEL	YEL	Ops Preparedness "gate" will not be passed until Safe Mode Contingency Procs completed and "Sim'd". Gyro #1 & #3 exhibit
SWIFT	May '04	RED	RED	RED	Code S to provide guidance over the use of a Thermal vacuum chamber required by both SWIFT and Messenger.
Astro-E2	Feb '05	YEL	YEL	RED	XRS helium leak anomaly has eroded schedule reserves.
GLAST	Feb '07	YEL	GRN	GRN	Preparations for December 3, 2003 Agency CR continue.
Herschel	2007	YEL	RED	GRN	FY2004 SPIRE kevlar problem funding issue was solved by Code SZ.
Planck	2007	GRN	GRN	YEL	Concern over cryocooler lifetime.
EUSO	2008	GRN	GRN	GRN	Waiting for ESA to approve for Phase B.
LISA	2011	GRN	GRN	GRN	On agenda for October 27 bilateral with ESA.
Con-X	2013	GRN	GRN	GRN	All technology areas progressing well.
Balloons	Ongoing	GRN	GRN	GRN	Nineteen flights in FY03 with 100% balloon success.

GRN	Proceeding on Plan, only normal, minor problems
YEL	Significant Problems or Concerns but feasible plan to resolve
RED	Major Problems; Solution path unclear

GP-B

ISSUES (Reasons for Yellow Status)

- Squid Readout Electronics (SRE) noise excessive for Gyros #1 and #3.
- Success of Ops preparation being determined by an independent team.
- Star Sensor B sync problem investigation has not revealed root cause.
- Launch Vehicle RIFCA testing underway to determine potential corona problem in Helium atmosphere.
- Budget shortfall relative to April Proposal.
- Open Paper Metric showing slow progress in closing items critical to flight.
- Slack to launch now Zero Days.

OSS PLAN OF ACTION

- KSC has replaced 3 GEM-40 motors (that have delaminations).
- Ops preparation to be assessed by Independent Team after completion of Safe Mode recovery Contingency Procedures and Mini-Sim (Nov 5) devoted to these Procedures. This means the assessment will not be completed until mid-November.
- SRE - failed oscillator due to use of non-flight parts- sufficient redundancy seems to be preserved via other methods (use of GPS clock).
- Thermal Blanket “tweaking” (following Penalty TV) acceptable to IRT.

SWIFT

ISSUES (Reasons for RED Status)

- SWIFT has slipped launch to May 15, and it may slip further because of scheduling conflict with Messenger over user of SES facility for Thermal Vacuum testing.

CURRENT STATUS:

- GSFC asked Code S for guidance on resolving the scheduling issue.

OSS PLAN OF ACTION

- Expect Code S to provide guidance this month.

Astro E2

ISSUE (Reason for RED Status)

- XRS Instrument Helium Leak
  - Helium leak detected in cryostat helium tank during XRS instrument-level performance testing. (Cryogenic temp).
  - Very small leak, difficult to isolate.
  - Schedule reserves eroded.
  - Earliest delivery date is March 2004. Schedule impact to ISAS likely if XRS is late by more than a nominal amount.
  - If unable to meet launch date of February 2005, potential worst case slip is 3 years (due to other launch slots taken).

OSS PLAN OF ACTION

- Fault tree plan continues to be followed to isolate the leak.
- Project in regular communications with Japan to develop potential workarounds.

GLAST

ISSUES

GLAST was Yellow last month due to several unresolved issues:

1) Cost and schedule.
2) Using Ku-band (TDRSS) vs X-band (USN).
3) Controlled reentry and propulsion system.

CURRENT STATUS:

1) Additional schedule and cost reserve based on risk to LAT schedule recommended. Moves LRD to 2-07 (5 month delay).
2) Project proceeding with implementing Ku-band, which provides a better technical solution and cost savings over life of mission.
3) Maintain propulsion system and remove when (if) Agency orbital debris guidelines are changed.

- These changes provide adequate reserves (cost and schedule) for management of the GLAST Program.

OSS PLAN OF ACTION

OSS review scheduled for late October. Confirmation review with Agency PMC scheduled for 12-3-03.

Herschel

ISSUE (Reason for Green Status) - SPIRE Kevlar suspension problem is solved after a seven month delay, but cost impact will be about $3M in FY04.

CURRENT STATUS:

- Project briefed Code SZ.

OSS PLAN OF ACTION

- Code SZ will provide the requested funding.

LISA

September Rendezvous in Hannover on September 9-12:

- Process defined to handle requirements with a MRD completed in October
- Good progress in coordinating U.S. and European GRS development:
  - U.S. Technology development approach accepted – Europeans comfortable
- IMS options vigorously discussed:
  - Did not converge as well as GRS – more work needed
  - Action plans to explore open questions

Current allocation between NASA and ESA:

- ESA provides 3 spacecraft
- Payload development and integration is performed by JPL and ESA
- GSFC responsible for integrating three flight systems (s/c already integrated with payload) into constellation

ESA Programme Deconstruction Activity

- ESA must reduce program to balance budget
- LISA one of 6 programs discussed at Oct 7 meeting of SSAC and working groups
- Subsequent SSAC meeting recommended LISA and LPF remain on schedule
  - Awaiting SPC confirmation of recommendation

Constellation-X

Large X-ray Mirror Technology Development

- Optical Assembly Pathfinder (OAP2) dry-run test preparations continue; the validation of a work-around for the incorrect motor configuration has been completed and the test is scheduled to being in October.
- AETD has identified class 10,000 clean space for Constellation-X mirror development and metrology activities—we are moving in.

X-Ray Microcalorimeter Spectrometer Technology Development

- The continuous 4-stage ADR has completed integration and characterization has begun.

Delta PDR's for Lockheed and NGST designs for the Advanced Cryocooler Technology Development Program (ACTDP) were held.

Six vendors responded to the RFI for the Flight Mirror Assembly (FMA) study contracts.

- The Project will continue individual discussions with five of the potential candidates in preparation for the RFP.
- A pre-bidders conference is planned in early November.

Senior Review 2004

- Senior Review: comparative review of MO&DA to maximize scientific return
- NASA uses recommendations to
  - Define an implementation strategy
  - Give programmatic direction for 2005, 2006
  - Issue preliminary guidelines for 2007, 2008
- Senior Review 2004 will be 6 weeks earlier in the year (relative to SR02)
- Missions and Archives/Services will be invited
- Budget requests must be in Full Cost
- Otherwise, details unchanged

Participants in SR04

Missions (8)	Archives (6)
CHIPS	HEASARC
FUSE	IRSA
GALEX	LAMBDA
INTEGRAL	MAST
RXTE	ADS
Swift	NED (@IPAC)
WMAP	
XMM-Newton	

Schedule for SR04

- Informal heads-up: Wed, Sep 10, ‘03

- Draft Call for Proposals: Wed, Nov 5, ‘03
- Proposals due: Wed, Mar 17, ‘04

- Senior Review: Tue Apr 27 - Fri Apr 30, ‘04
  (Project presentations on Apr 27-28)

Beyond Einstein

- NASA FY04 budget awaiting Congressional action
  - BE is in both mark-ups
- Several high profile activities
  - October 2, “Cosmic Questions” opened in Washington
  - October 15, AAS/AURA sponsored luncheon for staffers
- Beyond Einstein Program Office (BEPO) has been formed at GSFC
  - Contains LISA and Con-X projects
  - Supports GLAST project
  - Contains SEU theme support (E/PO, technology, strategic planning, public affairs, etc.)
  - Will manage Probe concept studies and, some day, Probe projects
- Beyond Einstein will enter Phase A as soon as FY04 budget is signed
  - FAD is ready to go
  - LISA and Con-X will also enter Phase A

Einstein Probes Mission Concepts

- Reminder: Einstein Probes are part of the Beyond Einstein Initiative, but they are not fully funded
  - Without a near term augmentation, first Probe will not start formulation until FY07 or later
- Multiple proposals received for every Probe and every Type of proposal
  - Quality is very high, program is very competitive
  - Selection is imminent
  - Objective of studies is to identify and roadmap pre-formulation activities, provide advocacy for acceleration, be ready to begin
- BEPO will provide appropriate management and coordination of activities

Einstein Probes

- Dark Energy Probe
  - PI's and some Co-I's will be invited to join the NASA/DOE JDEM Science Definition Team (SDT)
  - Joint "Dear Colleague" letter will solicit additional members of SDT
  - Funded study teams will work with the BEPO to inform NASA on mission requirements
- Inflation Probe
  - NSF is leading a multiagency roadmapping process on the future of CMB research
  - PI's will be invited to join the roadmap team
    - Selected teams will provide critical input into a multiagency technology development plan
- Black Hole Finder Probe
  - PI's will conduct mission concept studies

Beyond Einstein E&PO

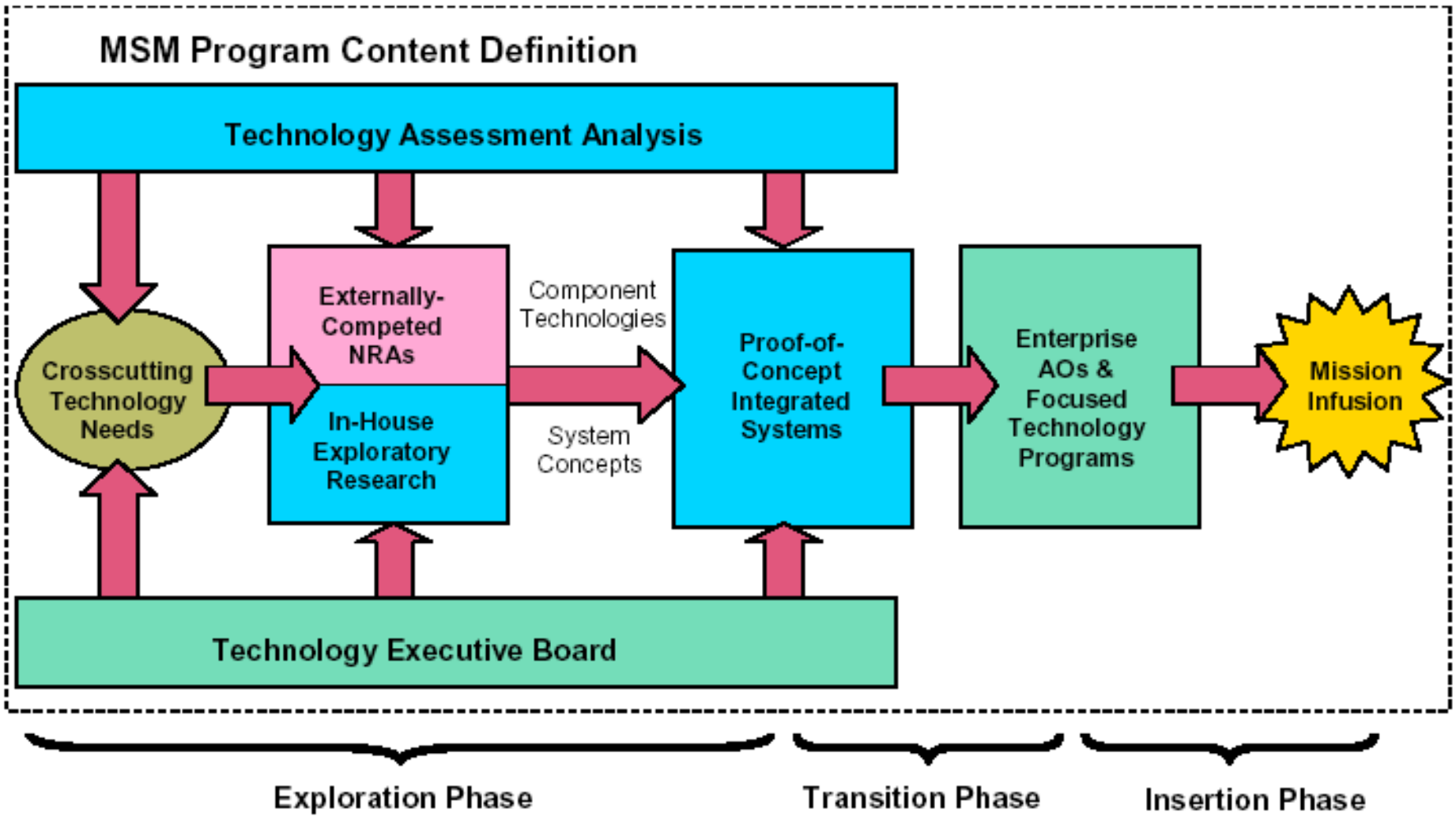
- Development of E&PO plans kicked off on 9/25
  - Meeting included Mission E&PO leads, SEU Forum rep, Brokers, teachers, NSTA and Theme personnel
  - Reviewed Knappenberger Report, Code N vision and discussed target audiences
  - Focus groups to discuss audiences, partnerships, standards alignment and new directions in public outreach
- Intent is to develop some short term priorities that can be entered into upcoming budget cycle for FY05.
  - Continuation of discussions through 04 leading to E&PO strategic plan in FY05 that encompasses Code N vision and OSS plans.
  - Standards alignment issues will follow lead of OSS Framework Initiative which will be completed in early FY05.
- Progress report to SEUS at next session

SEU Technology

SBIR

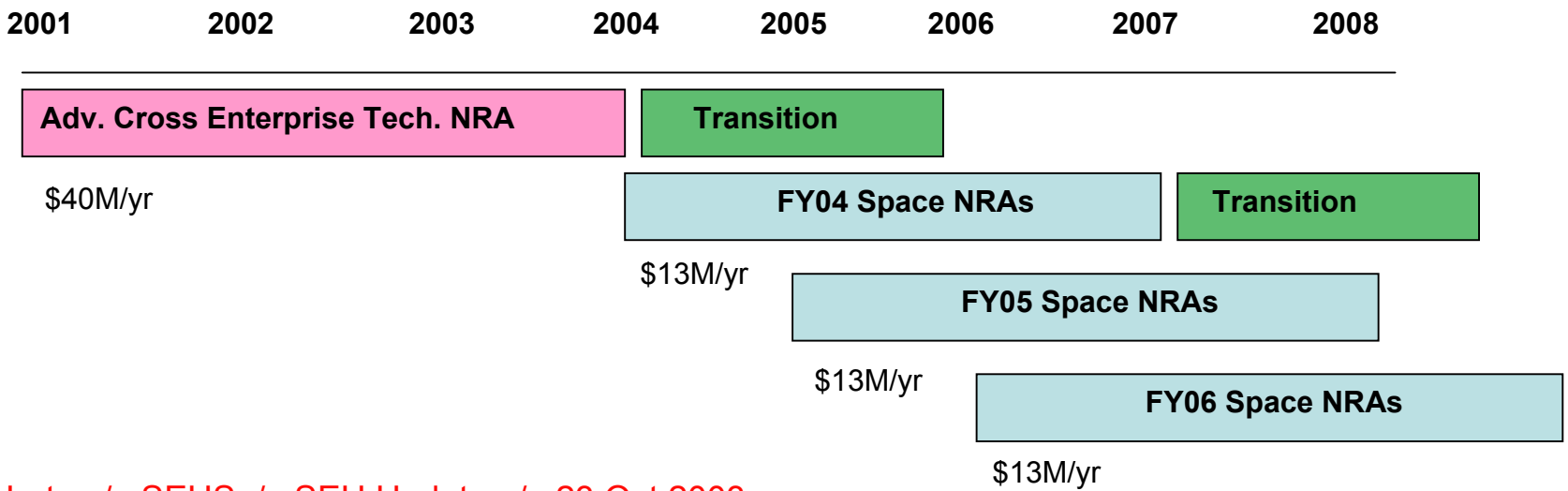
- Funding at 3 levels: phase I ($70K/6 months), II ($600/24 months) and III (by contractual arrangement)
- For SEU Technologies are sought in these areas:
  - Sensors & Detectors
  - Balloons
  - Formation Flying
  - Cryogenic Systems
  - Space Observatory Technology
- Phase I
  - Latest solicitation closed Sept. 9
  - 2,677 SBIR Proposal submissions up from 2,238, last year
- Phase II
  - 31 SBIR 2002 Phase II awards in Space Science were made on Oct. 6; of interest to SEU
    - 1 Balloon Technology
    - 3 Cryogenic/thermal Systems
    - 4 Observatory Technology
    - 1 Sensor/Detector Technology

Code R: Mission & Science Measurement Technology Infusion Strategy



Code R: Enabling Concepts & Technologies Program NRAs

- Completing 111 exploratory research tasks selected via $120M Advanced Cross-Enterprise Technology NRA in 2000. Plan to complete majority of tasks in FY03.
- Starting in July 2003, several smaller NRAs will be issued each year to ensure a continual influx of new ideas. The NRAs will be focused on specific technology areas, and have a duration of 3 years.
- The FY04 NRAs will focus on three main areas, which were selected by the NASA Enterprises:
  - Advanced Measurement and Detection Technology (Codes S, Y, U)
  - Large Aperture Technology (Codes S, Y)
  - Low Power Microelectronics Technology (Code S)



Code R: Enabling Concepts & Technologies Program

Transition Funding

- 111 tasks funded in the Code R omnibus technology NRA in 1999. Of these 24 are of high interest to SEU.
  - 1 ultra reliable power generation & storage
  - 16 Sensor, Instruments & Coolers
  - 3 Formation Flying
  - 2 Space Communications and metrology
  - 1 Low power electronics
  - 1 Large deployable structures
- Transition funding work will start when the current ECT NRA is finished.
- Code R is looking for "co-sponsorship". In the case of SEU/ASO, the A&P Division has expressed an interest in finding sponsorship for some of the task through existing technology developments
- Code R will supply 2 page summary proposals from the PIs of currently funded tasks. These will be reviewed by A&P division for possible co-funding

SEU Technology

NRAs

9/12 Code S Vision Mission NRA Proposals due

10/3 Code R Mission and Science Measurement Technology (MSMT-2004) Proposals due

- Advanced Measurement & Detection Technology ($5M)
- Large Aperture Technology ($5M)
- Low Power Microelectronics Technology ($3M)

12/16 ST9 Supporting Technology NRA Release Date

- Solar Sail Flight System Technology
- Formation Flying System Technology
- System Technology for Large, Space Telescopes
- Descent and Terminal Guidance for Pinpoint Landing and Hazard Avoidance
- Aerocapture System Technology for Planetary Missions